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USMC ILC Proof of Concept: Results from the First Year

Berta Heybey • Anthony Freedman

4825 Mark Center Drive • Alexandria, Virginia 22311-1850

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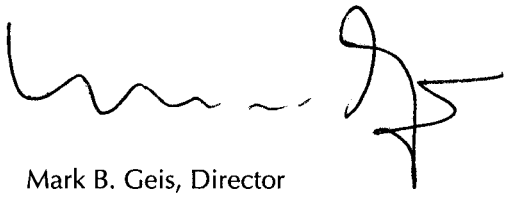

Mark B. Geis, Director
Naval Operations and Support Team
Integrated Systems and Operations Division

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USMC ILC Proof of Concept: Results from the first year

Berta Heybey
Anthony Freedman
December 2002

The Center for Naval Analyses

In late March 2001, the Integrated Logistics Capability (ILC) Center began plans for an extensive proof of concept (POC) demonstration at 2d Force Service Support Group (FSSG), II Marine Expeditionary Force (MEF) near Jacksonville, NC. In early April, the Commanding General, 2d FSSG directed the realignment of major supply and maintenance functions within 2d FSSG. This realignment started with five of the seven battalions within 2d FSSG—Headquarters and Service (HQSVC); Maintenance; Supply; Medical, and Dental. The remaining two battalions—Transportation Support Battalion (TSB) and Engineering Support Battalion (ESB)—followed in the summer of 2001.

This brief contains an overview of the final assessment of the POC. Until this point, ILC concepts have been confined to 2d FSSG. However, testing of ILC concepts will expand to include 2nd Marine Division starting in the winter of 2002/03. This brief covers the first phase of ILC implementation before the expansion to 2nd Marine Division. We provide data on trends in the three primary quantitative measures we tracked throughout the POC: supply response time, repair cycle time, and materiel readiness rates. We also discuss some results of surveys of maintenance personnel and 'customers' of the logistics system, comparing operations prior to and after one year of the POC. The POC will become a part of the Expanded Validation and future assessments will look at both 2d FSSG and 2nd Marine Division.

Primary observations

- Improved supply response time
- Improved overall repair cycle time
- No significant changes in readiness
- Indications that maintenance quality may improve in future through improved training of maintenance personnel
- Customer satisfaction with logistics support has declined, though there are recent signs of improvement

The brief discusses five findings from the POC. This list is not meant to be a comprehensive one; instead, it provides a snapshot of some of the indications we see in the data after one year of the POC.

The first two—improved supply response time (SRT) and repair cycle time (RCT)— are positive trends. In each month of the POC, SRT and RCT are lower than in corresponding months the year prior to the POC. (That is, we compare March 2002 with March 2001, April 2002 with April 2001, and so forth.)

Thirdly, we have not seen any real changes in readiness. At this point, readiness levels are about where they were before the POC began. There was a steep drop at the beginning of the POC for Delta TAMCNs, but their readiness has rebounded to pre-POC levels.

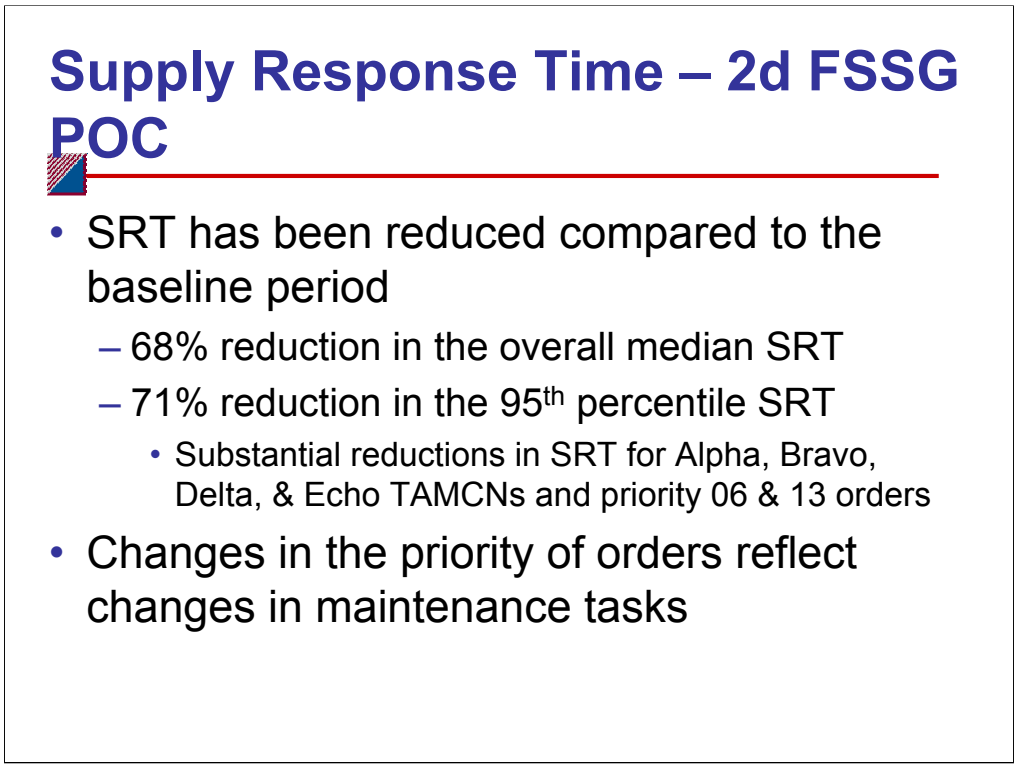
The fourth finding concerns maintenance personnel. Baseline surveys showed that junior enlisted maintenance personnel spent only about one-fourth of their workday performing maintenance-related activities. By the mid-term surveys, in January/February 2002, they reported spending one-third of their time on maintenance-related activities. In the final surveys, in September 2002, they reported spending over 40 percent of their time on maintenance-related activities. Both the mid-term and final surveys also showed that more maintenance Marines were working within their MOSs, and that they felt more confident performing the duties of their MOS than prior to the POC. The combination of these findings is a positive sign for increased quality of maintenance support in the future. However, these are long-term issues and should be tracked in the future to look at whether these trends continue and what the effects on maintenance support will be.

Primary observations (Con't)

- Improved supply response time
- Improved overall repair cycle time
- No significant changes in readiness
- Indications that maintenance quality may improve in future through improved training of maintenance personnel
- Customer satisfaction with logistics support has declined, though there are recent signs of improvement

Customers: defined as those within the FSSG who are relying on maintenance and supply support (commanders, executive officers, platoon leaders, and so forth) do not report seeing the results of these positive trends. In January/February 2002, they reported much greater levels of dissatisfaction with maintenance and supply support than they did at the beginning of the POC. In September 2002, while still less satisfied than prior to the POC, we did see some improvement. For example, when we compare the midterm and final surveys, we see a statistically significant increase in satisfaction with maintenance complaint resolution. While still not reaching the satisfaction level as was reported prior to the POC, this result is an indication that the system for complaint resolution—a major issue customers reported in the midterm surveys—may be starting to improve. This result demonstrates that some of this dissatisfaction may be due to the inherent difficulties in implementing any new system.

The brief discusses each of these observations.



Supply response time (SRT) is significantly lower than before the POC. SRT was lower every month during the POC compared with the corresponding month the previous year. Since maintenance personnel are not waiting for parts as long as they were prior to the POC, they can complete their repairs more quickly.

The overall median and 95th percentile decreased by 68 percent and 71 percent respectively. During the POC, the average monthly median SRT decreased from 15 days to 5 days. (Median SRTs ranged from 10-22 days before the POC, and 1-8 days during the POC.) We also see a drastic reduction in the variability of supply response time during the last few months as compared to the baseline period. The 95th percentile in October 2000 was 91 days, while in October 2001 the 95th percentile was 50 days; and by October 2002, 33 days.

One driver behind this reduction in SRTs has been the new policy of delivering twice a day to supported units. A second driver is that supply personnel are becoming more familiar with ATLASSII+ and are more able both to use the system effectively and to work around problems with the system when needed.

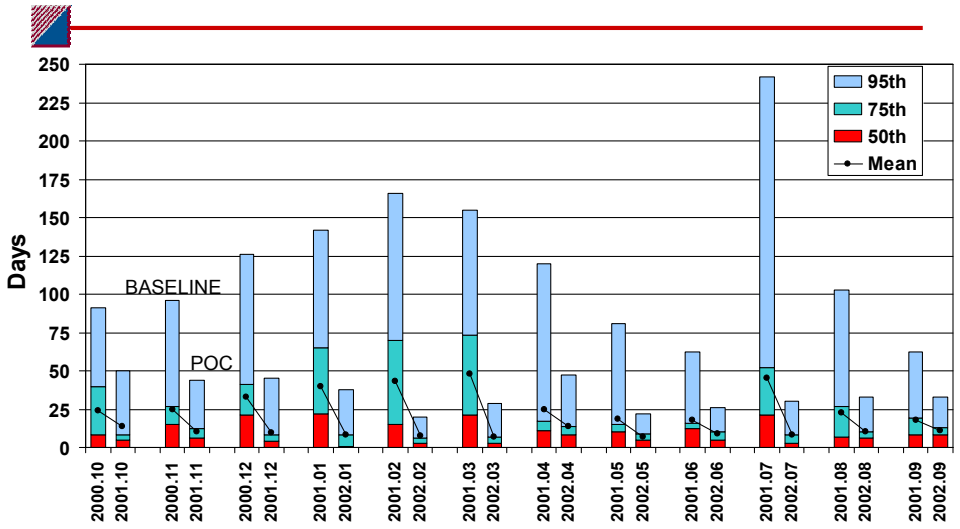
Supply Response Time – 2d FSSG POC (Con't)

- SRT has been reduced compared to the baseline period
  - 68% reduction in the overall median SRT
  - 71% reduction in the 95th percentile SRT
    - Substantial reductions in SRT for Alpha, Bravo, Delta, & Echo TAMCNs and priority 06 & 13 orders
- Changes in the priority of orders reflect changes in maintenance tasks

When the data was split by TAMCN, we see similar trends with each TAMCN category. The median SRT decreased by 65% for Alpha TAMCNS, 70% for Bravo TAMCNs, 63% for Delta TAMCNs and 85% for Echo TAMCNs. Similar trends were seen for priorities 06 and 13. There was no trend in priority 03, and very few data points to draw meaningful conclusions.

Priority 03 orders increased steadily in recent months compared with the corresponding months in the previous year. There was no overall trend in the number of priority 06 orders. In contrast, there has been a substantial reduction in priority 13 requisitions every month.

Supply Response Time – 2d FSSG
(TAMCN = A, B, D, and E)



Decrease in SRT each month as compared to the year prior to the POC

During the POC, we see substantial improvements in the time the parts are delivered to maintenance. The SRT decreased every month during the POC compared with the corresponding month the previous year. The overall median and 95th percentile SRT decreased by 68 percent and 71 percent respectively.

During the POC, the average monthly median SRT decreased 68 percent from 15 days to 5 days. (Median SRTs ranged from 10-22 days before the POC, and 1-8 days during the POC.)

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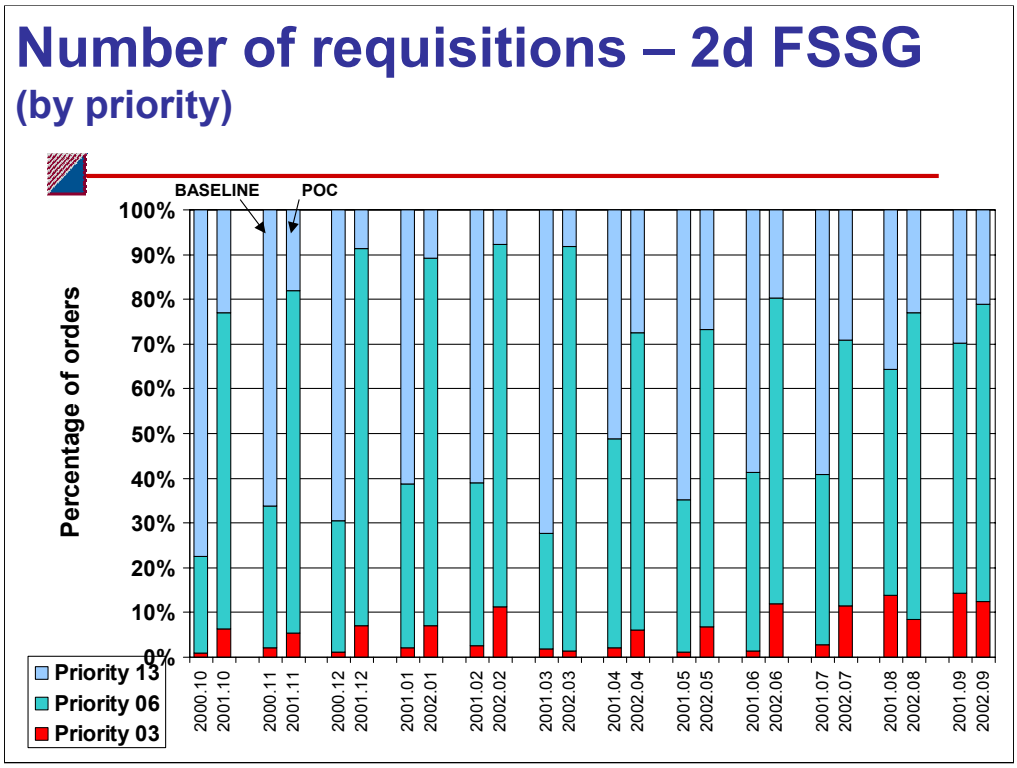


The distribution of orders across priorities has changed throughout the POC. For most of the POC, we see a much larger percentage of priority 06 orders compared to priority 13 orders than prior to the POC. However, the difference is lessening in recent months—the September 2001 and September 2002 data have very similar distributions across priorities. This data may mean that the maintenance process has adjusted to the new system and overcome the backlog of priority 06 repairs.

At the same time, for most months, there has been an increase in the number of orders during the POC. Primarily, the increase has been in priority 03 (49 percent increase) and 06 (34 percent increase) orders. In contrast, there were substantially fewer (76 percent decrease) priority 13 orders during the POC than before the POC.

Impact of reduced SRT on maintenance

- Changes in supply support have helped improve maintenance
  - Two deliveries a day from the ISSA to the units have lowered supply response time
  - Reduced wait times for parts improve RCT
  - More consistent supply support means that maintenance personnel do not have to spend as much time on supply activities

One driver behind this reduction in SRTs has been the new policy of delivering twice a day to supported units since January 2002. A second driver is that supply personnel are becoming more familiar with ATLASSII+ and are more able both to use the system effectively and to work around problems with the system when needed.

In addition to the direct effect on RCT, quicker and more consistent supply of repair parts also contributes to lowered RCT by decreasing the burden on maintenance personnel to act as their own supply support. Prior to the POC, maintenance shops reported dedicating several clerk-level billets (2-4) to finding parts through alternative sources, meaning independent research into source of supply and credit card orders. With shorter, more consistent supply times, these Marines can be used for duties supporting maintenance, rather than supply, further reducing RCTs by adding to the pool of available maintenance personnel.

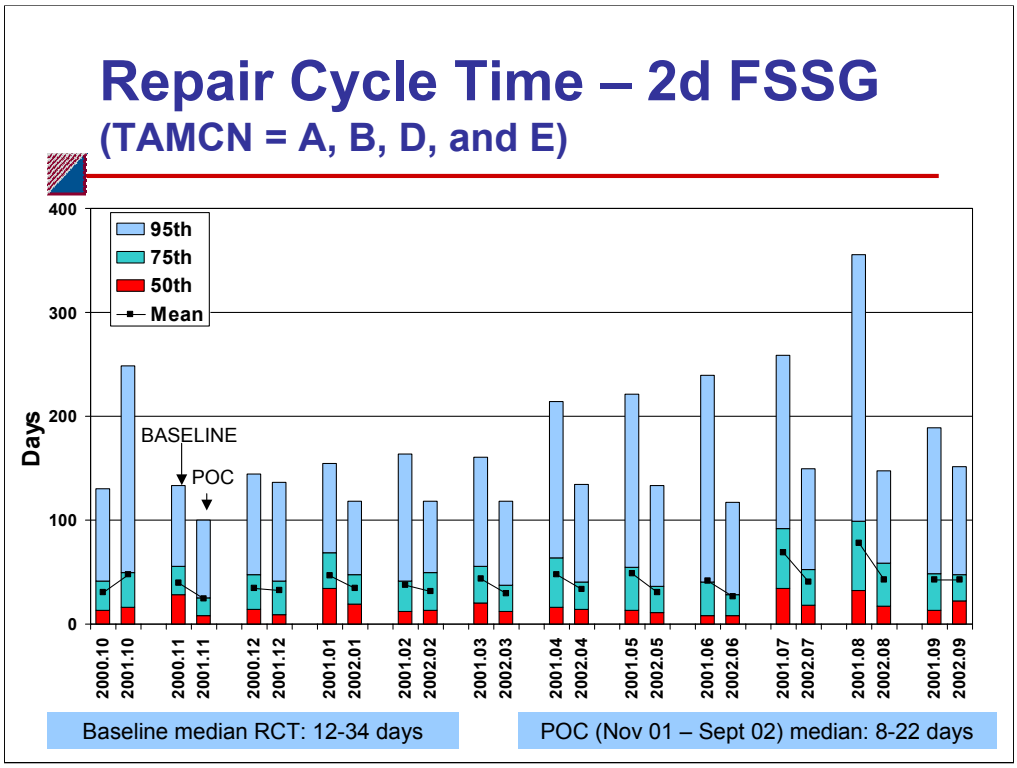
Repair Cycle Time – 2d FSSG POC

- RCT has decreased compared to the baseline period
  - 33% reduction in overall median RCT
  - 35% reduction in 95th percentile RCT
    - Substantial reductions for Alpha, Bravo, & Delta TAMCNs; priority 06 & 13 tasks; corrective maintenance tasks
- Substantial increase in the number of tasks completed compared to the baseline period

Throughout the POC, we have been tracking repair cycle time (RCT) for maintenance tasks. RCT is an important performance measure in terms of testing several of the hypotheses listed above. We calculate RCT by individual task, rather than by work order number (WON). This method provides a more accurate picture of the length of time it takes to perform individual repairs than calculating by WON because WONs remain open as long as any of the tasks on that WON are still open. Since tasks can be added at any time, an individual WON can be open for extremely long periods of time even after the original repair tasks are completed.

The following slide compares the data for each month with the corresponding month the previous year. This is done to account for seasonal trends in the data.

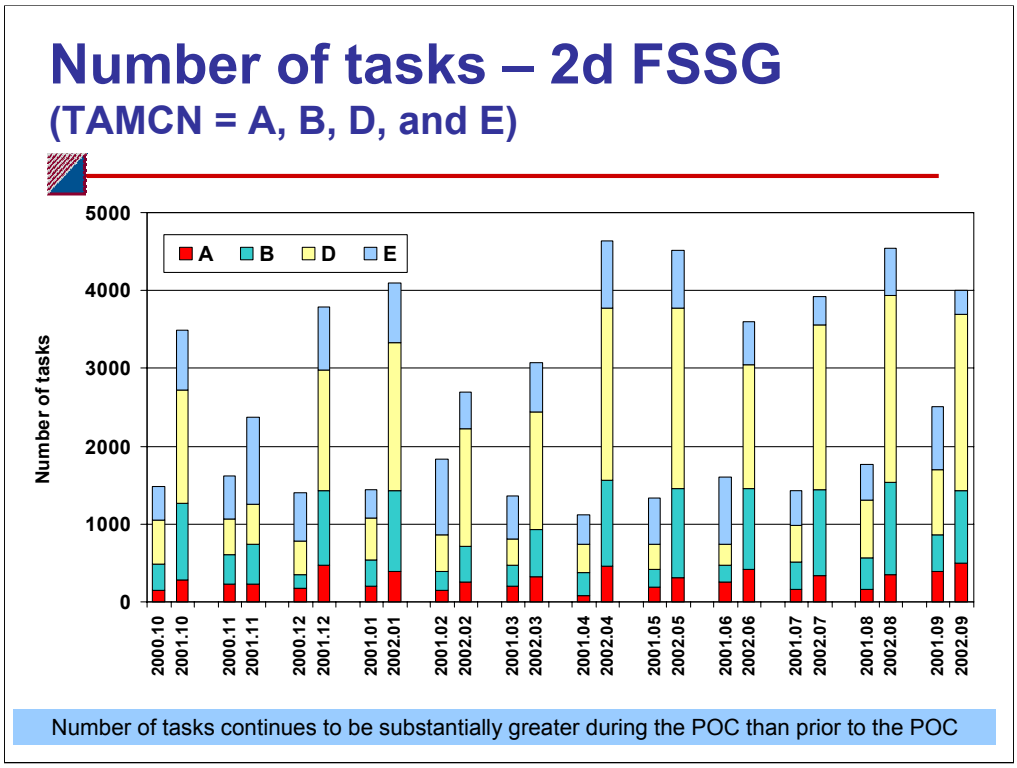
Overall: RCT decreased consistently for each month of the POC as compared to the corresponding month the previous year.



The median RCT decreased by 33 percent from an average of 20 days prior to the POC to 14 days during the POC. (The median ranged from 8-34 days before the POC, and 8-22 days during the POC.) The variability, as measured by the 95th percentile, also fell by 35 percent: from 130 days prior to the POC (ranging from 77 to 199 days) to 85 days during the POC. (The 95th percentile ranged from 77 to 199 days prior to the POC and 68 to 97 days during the POC.)

Median RCT for Alpha, Bravo, and Delta TAMCNs decreased by 60 percent, 60 percent and 49 percent, respectively, during the POC. The median RCT for Echo TAMCNs increased by 9 percent, but there was no overall monthly trend either up or down during the POC. The baseline median RCT for Echo TAMCNs was much lower than the other three categories and continued around the same level during the POC.

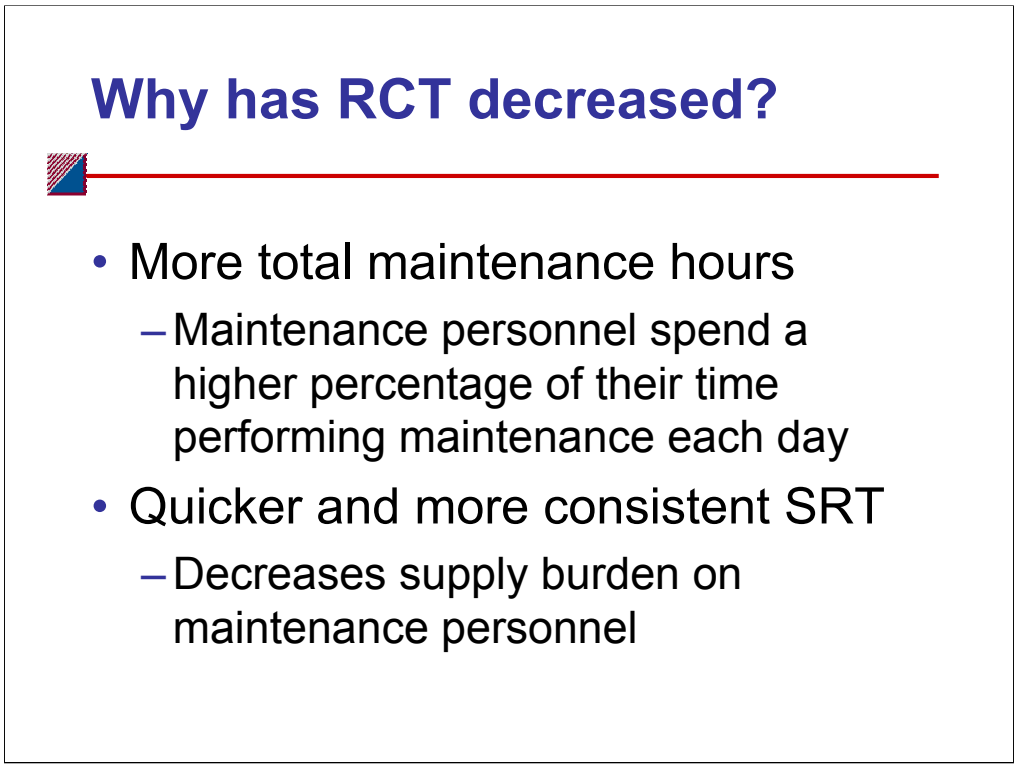
During the POC, we also see that the variability of RCT, as measured by the 95th percentile, has decreased. This reduction is just as important as the median RCT. If operators know that they will normally receive their equipment in a certain number of days, they can plan accordingly. Decreases in the variability of RCT are likely partially due to decreases in supply response time for mechanics waiting for parts.



The number of tasks has increased substantially in recent months.

The number of tasks has also increased substantially in recent months. In particular, Bravo TAMCNs (average monthly increase of 918), and Delta TAMCNs (1808) increased dramatically. Alpha TAMCNs (average increase of 167 tasks) and Echo TAMCNs (average increase of 53 tasks) also showed average monthly increases, though somewhat lower than Bravo and Delta TAMCNs.

This increase may be due to several factors. In some cases, maintenance personnel are working longer hours than they did during the baseline period. In addition, the 'bumper-to-bumper' maintenance policy means that more tasks may be opened on individual pieces of equipment than in the past because maintenance personnel are performing more thorough inspections. Finally, maintenance personnel report that they spend more of their day performing maintenance, increasing total maintenance hours available to complete tasks.



Why has RCT decreased? The combination of shorter RCT while maintenance personnel are completing more tasks shows that the initiatives implemented by the ILC have substantially improved efficiency. In other words, more work has been done in a shorter time frame. There are several possible reasons for this result:

1) More maintenance hours

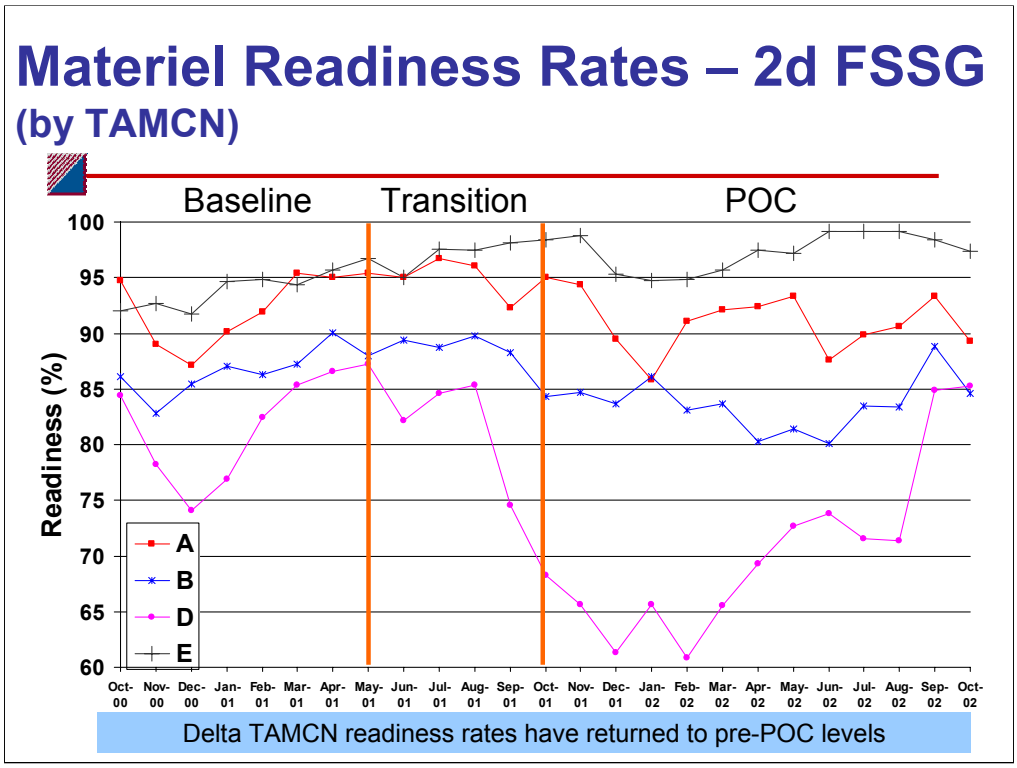
- Survey data shows that maintenance personnel are spending a higher percentage of their time performing maintenance-related activities than they were prior to the POC. Junior enlisted maintenance personnel, in particular, are spending almost half of their work day performing maintenance, a substantial improvement over to the one-quarter of their day they reported prior to the POC.
- 2d Maintenance Battalion personnel have worked longer hours, particularly during the 'maintenance surge' in October 2001, during the POC than previously.
- With more total maintenance hours per day, tasks may have been able to be completed in a shorter time period than they would have with fewer man-hours per day. The large increase in the number of tasks completed since the beginning of the POC supports this conclusion.
- Fewer redundant inspections, as a result of the consolidation of 2nd and 3rd echelons of maintenance at 2d Maintenance Battalion, may also be contributing to the reduced RCT.

Why has RCT decreased? (Con't)

- More total maintenance hours
  - Maintenance personnel spend a higher percentage of their time performing maintenance each day
- Quicker and more consistent SRT
  - Decreases supply burden on maintenance personnel

2) Quicker and more consistent supply response time

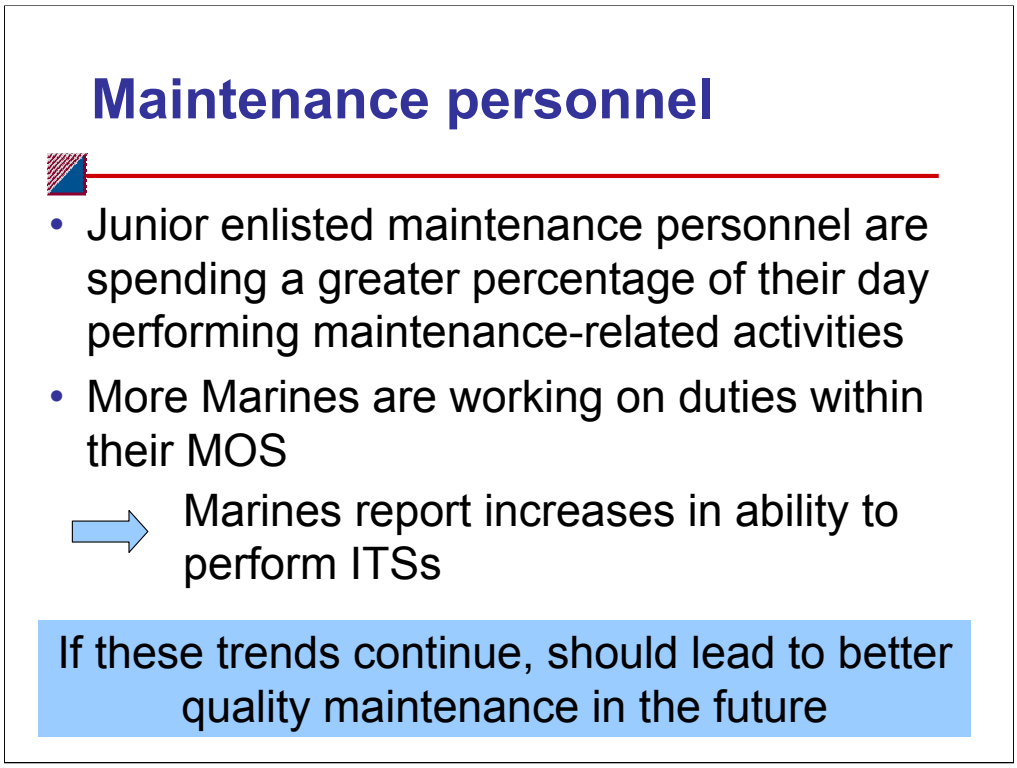
- Supply response time (SRT) is significantly lower than before the POC. SRT was lower every month during the POC compared with the corresponding month the previous year. Since maintenance personnel are not waiting for parts as long as they were prior to the POC, they can complete their repairs more quickly.
- In addition to the direct effect on RCT, quicker and more consistent supply of repair parts also contributes to lowered RCT by decreasing the burden on maintenance personnel to act as their own supply support. With shorter, more consistent supply times, these Marines with maintenance MOSs can be used for duties supporting maintenance, rather than supply, further reducing RCTs by adding to the pool of available maintenance personnel.



The slide shows materiel readiness rates at 2d FSSG from October 2000 – October 2002. The orange lines divide the baseline period, the transition period to ILC concepts, and the proof of concept period. The data for summer 2001 should be considered a transition period, as personnel and equipment began moving to the new organizational structure.

Throughout the POC, readiness rates for Alpha (Communications/Electronics), Bravo (Engineer) and Echo (Ordnance) TAMCNs remained at similar levels as before the POC began. There were no significant changes that could be attributed to the POC. Alpha and Echo TAMCNs tend to have higher readiness rates than Bravo TAMCNs during both the baseline and POC periods. Alpha and Echo TAMCN readiness rates range from 84 percent to 98 percent; Bravo TAMCNs from 78 percent to 89 percent.

Delta (Motor Transport) TAMCNs, on the other hand, showed a marked drop in readiness in Fall 2001, at the beginning of the POC. Readiness for Delta TAMCNs reached a low of 61 percent in February 2002. However, readiness in October 2002 had rebounded back to levels similar to during the baseline period (around 85 percent). This drop in readiness was likely the result of the implementation of the 'bumper-to-bumper' maintenance policy, which uncovered deficiencies that had likely gone unnoticed for a long period of time. Once the backlog of equipment needing repair was reduced, readiness rates returned to their normal levels.

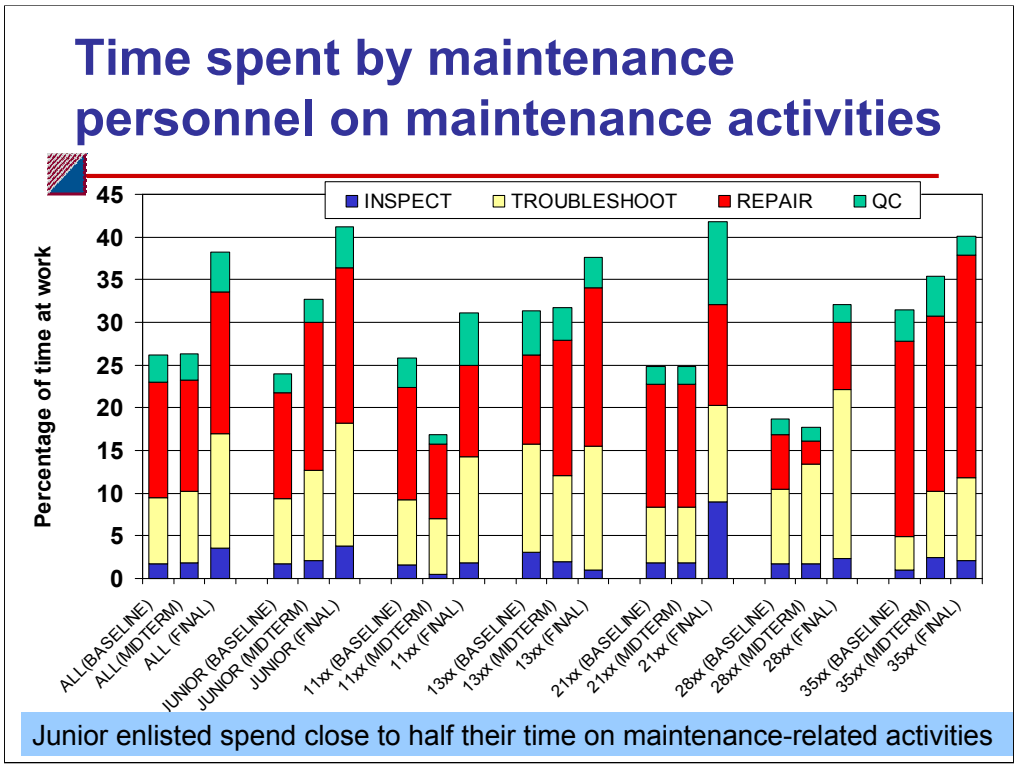


One goal of implementing ILC is to improve processes so that logistics personnel can perform their jobs more effectively and efficiently. Materiel readiness, repair cycle time and supply response time are all affected by the time logistics personnel spend performing their jobs.

Survey data shows that maintenance personnel are spending a higher percentage of their time performing maintenance-related activities than they were prior to the POC. Junior enlisted maintenance personnel (PVT through CPL), in particular, reported spending almost half of their work day performing maintenance in September 2002, a substantial improvement over to the one-quarter of their day they reported prior to the POC. The increased time spent on maintenance is likely an important factor in the decreased repair cycle times reported during the POC.

In addition, for a majority of maintenance Military Occupational Specialties (MOS), more Marines are working on duties within their MOS than were before the POC. In addition, in many cases, confidence in performing ITSs (Individual Training Standards) within individual MOSs has increased.

The increase in confidence could be due to a variety of factors, one of which is more time spent performing their MOS duties. Junior maintenance Marines reported spending more time on maintenance-related activities at the midterm point of the POC than they were spending before the POC. Since they may be practicing their MOS duties more, they may feel more confident in their ability to perform their MOS and may be able to provide better quality maintenance in the future.



The slide shows the time spent by maintenance personnel on maintenance-related activities: inspections, troubleshooting, repairs and quality control. The data is divided by rank (junior enlisted (PVT through CPL), and by MOS: 11xx (Utilities); 13xx (Engineer, Construction, Facilities and Equipment); 21xx (Ordnance); 28xx (Data/Communications Maintenance); and 35xx (Motor Transport).

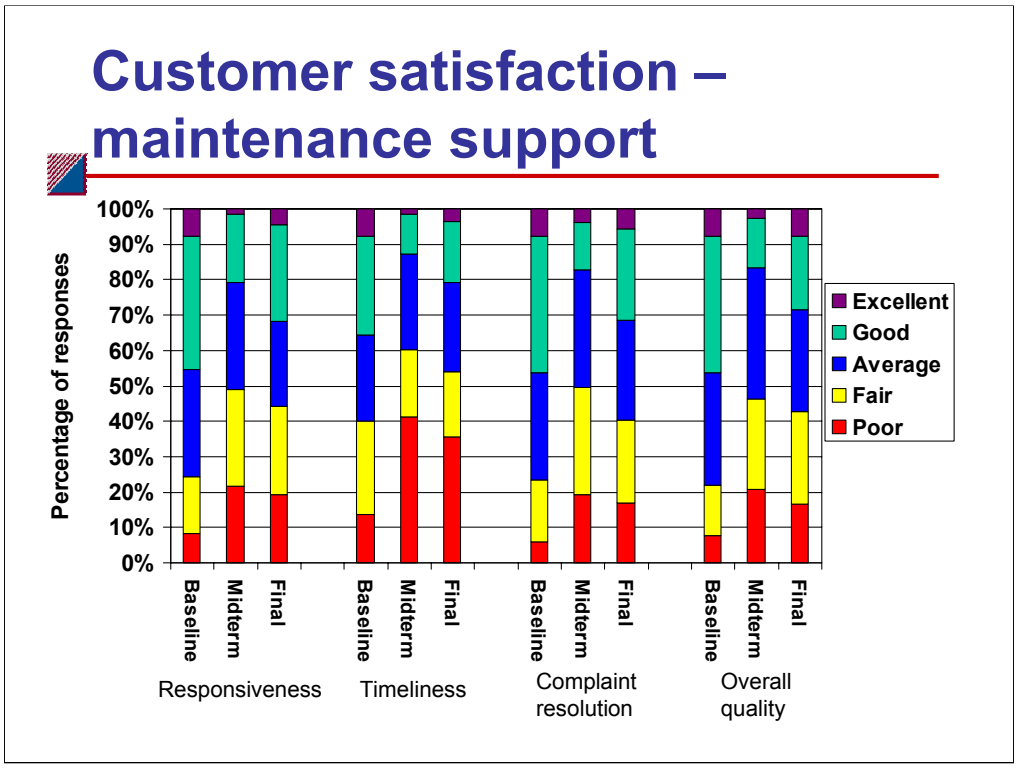
The overall time spent performing maintenance-related activities has jumped to 38 percent, up from 26 percent prior to the POC. Junior Marines (PVT through CPL) report even more time—41 percent from 24 percent. This percentage translates into about an hour of additional maintenance time (using an 8 hour workday) per Marine per day.

Customer satisfaction

- While satisfaction remains lower than was reported prior to the POC, the final surveys showed improvement over the midterm surveys
- In particular, satisfaction with maintenance complaint resolution has increased since the midterm surveys
- Current lack of IT to support changes may be one reason for the dissatisfaction

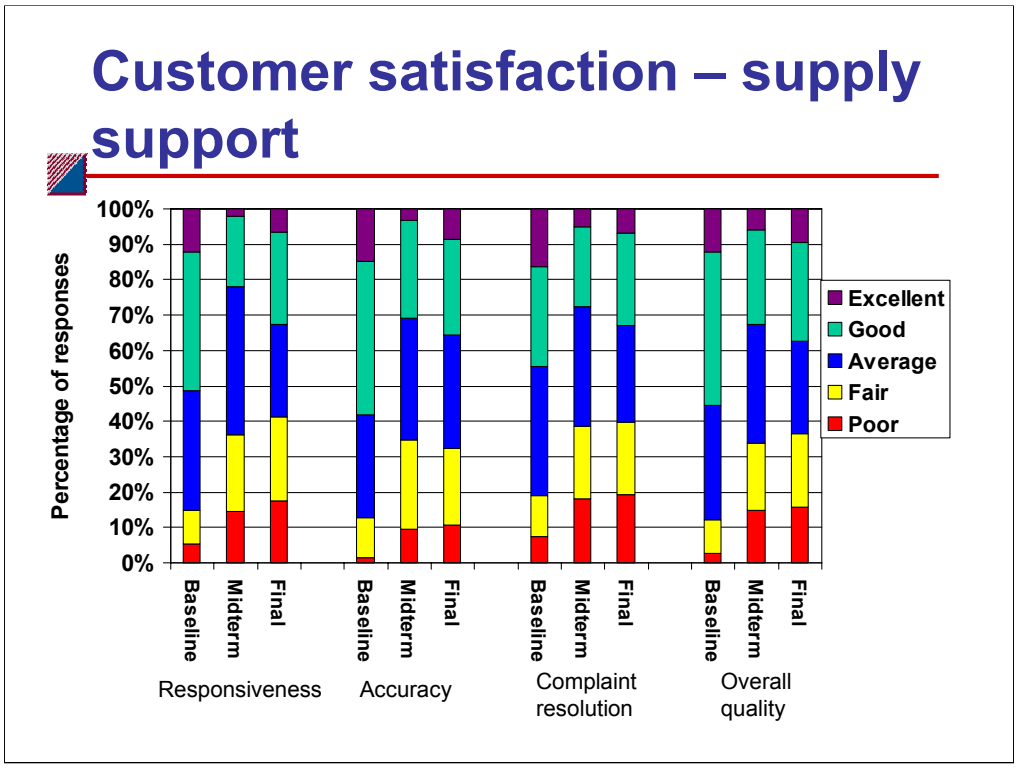
Measuring the 'quality' of logistics support is difficult, since 'quality' is inherently a subjective issue. However, as an attempt to measure the 'quality' of logistics support, we surveyed 2d FSSG personnel about their satisfaction with maintenance and supply support. 'Customers'—supervisors in the FSSG who receive supply and maintenance support—reported much lower levels of satisfaction with the support they are receiving during the POC than they did during the baseline period.

Many of the issues customers in supported units raised can be traced directly to the lack of IT to support new procedures. For example, on both the maintenance and supply sides, a frequent comment was that the number of supply and maintenance Marines that remained in the battalions was not enough to handle the remaining workload. FSMAO noted this issue in their June 2002 report as well. This problem can be traced to the lack of an IT system that can support ILC concepts. Using units must still track their orders and equipment using old methods, despite the fact that most of their logistics personnel have been moved to 2d Maintenance and 2d Supply Battalions.



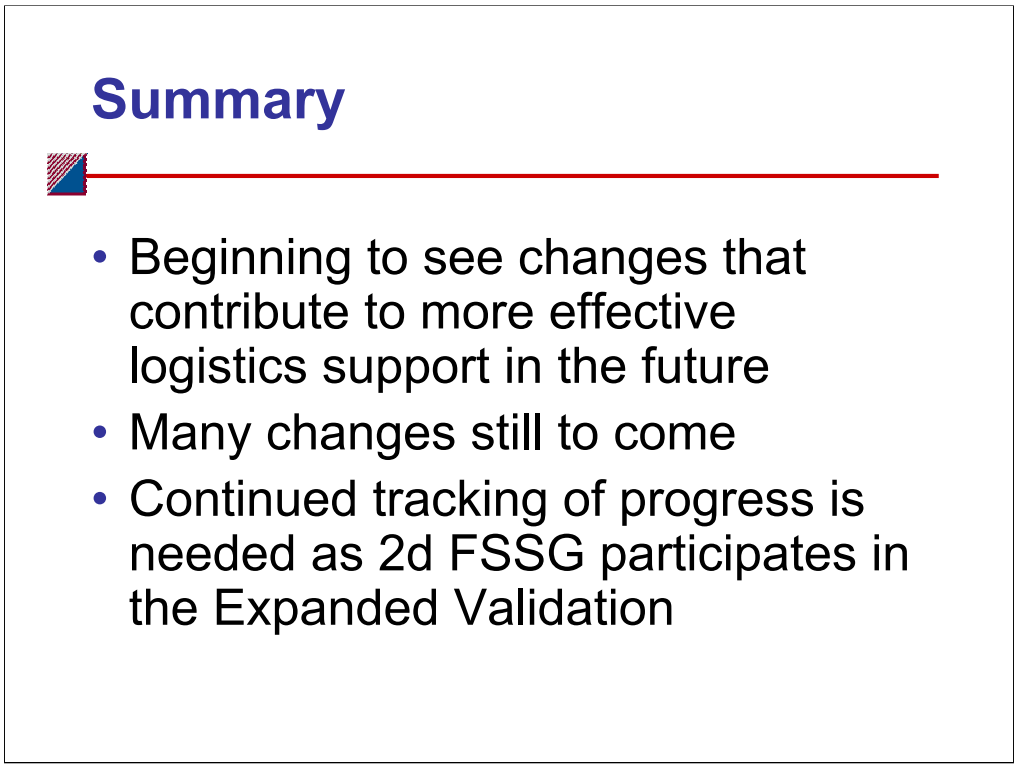
When we compare the midterm and final surveys, we see a statistically significant increase in satisfaction with maintenance complaint resolution. While still not reaching the satisfaction level as was reported prior to the POC, this result is an indication that the system for complaint resolution—a major issue customers reported in the midterm surveys—may be starting to improve.

36 percent of respondents rated the overall quality of maintenance support either poor or fair in the final survey, down from 46 percent at the midterm, but still higher than the 22 percent in the baseline. At the same time, only 24 percent rated overall support either good or excellent, up from 16 percent at the midterm, but still substantially lower than the 46 percent reported during the baseline. All three elements of maintenance support that we asked about (responsiveness to requirements, timeliness of repair, and resolution of service complaints) showed similar increases in dissatisfaction, when compared to the baseline.



The percentage of respondents rating overall supply support either poor or fair remained at about the same level as at the midterm point. (33 percent of respondents, compared to 12 percent in the baseline). The percentage rating overall support either good or excellent also stayed at about the same level as at the midterm (33 percent, compared to 55 percent in the baseline). All three separate elements of supply support (responsiveness to requirements, accuracy of orders and resolution of service complaints) saw similar increases in dissatisfaction

The respondents mentioned difficulties with the operation of the SUL system as the primary issue. We found in our baseline surveys and interviews that using units had difficulty determining the status of their orders using ATLASSII+ and had to rely on personal relationships with ISSA personnel to maintain visibility on their orders. It appears that, while the IT has changed, the result is still the same. The most frequent comment in the final surveys was that units still had to rely on individual conversations with Supply Battalion personnel, rather than on the SUL system, to track their orders.



After one year of the proof of concept, we are starting to see improvements: reduced supply response time for repair parts, reduced repair cycle times for individual repair tasks and an increased proportion of time maintenance personnel spend on maintenance-related activities each day. In the long run, all three of these changes should contribute to more effective logistics support. Several of the current issues at 2d FSSG, such as supported units' complaints that they do not know the status of their equipment in the maintenance cycle, can be traced to the current incomplete nature of information technology support appropriate for the ILC concept.

At this point, the POC is by no means a complete demonstration of ILC concepts. Changing logistics processes cannot be achieved overnight. The ILC concept involves not only changes in the physical locations of personnel and equipment, but also the more difficult process and culture changes. At this point in the proof of concept, the first stage—physical movement of personnel and equipment—is fairly complete. However, the majority of the associated process changes have not yet occurred, though they are well into the planning stages. Until these process changes occur, it will be difficult to judge the true impact of implementing the ILC.